

line and returning to our starting-point, the perpendiculars will be found pointing in a direction the opposite of that with which we started." Here then is the solution of the difficulty. As we move over our surface along a geodesic, the instantaneous Euclidian plane containing the beginnings of successive perpendiculars (for *small initial* portions of two successive perpendiculars to a geodesic will lie in a Euclidian plane) rotates about the instantaneous tangent to the geodesic, and it does not complete a rotation until we have travelled *twice* the complete length of the geodesic. The perpendicular is a vector quantity, and changes sign by passing through $\frac{1}{2} \sqrt{-1}$. Also, a geodesic does

not divide the surface into two completely separate regions, as a great circle does a sphere or a straight line a plane. The two regions are continuous with one another, and it is possible to get from the one to the other along a finite path without crossing the geodesic.

F. W. FRANKLAND

Registrar-General's Office, Wellington,
New Zealand, April 14

Ascent of Etna

IT was a bright sunny sky on the last day of April when we started, with Giuseppe Sedici as guide, from the Grand Hotel at Catania in a carriage and pair bound for Nicoloni, *en route* to the summit of Etna. A dusty drive of two and a half hours, and we were at the door of the inn in the centre of the village. Its appearance was somewhat forlorn, and its fare rather meagre, but the civility of mine host compensated for all other defects. Here we engaged two mules, a porter, and a driver, an operation which took more than two hours, and then set off again for the Casa del Bosco, which we reached in the middle of the afternoon after a ride of two and a quarter hours. A climb up a neighbouring hilllock to see the sunset, dinner, and a few hours' rest filled up the time till 11 p.m., when we started off again and rode for about half an hour, till the appearance of snow made it necessary to dismount and continue the remainder of the journey on foot. Our guide was very slow, and on any attempt to force the pace stood still and ejaculated: "Fermo, Signore! Piano, Piano!" so that we did not arrive at the Casa Inglese till 5 a.m., and were obliged to content ourselves with seeing the sun rise from here instead of from the top, as we had intended. It did not much matter, as it was a cloudy morning, and the view was very poor, but still it was a disappointment. The Casa Inglese was covered with snow to the eaves of the roof, the observatory buried altogether, the Val del Boe a sea of white. After a short rest we trudged on again; so far it had been good walking up an easy ascent of crisp snow, but now it became a work of difficulty to pick one's way through deep drifts and treacherous-looking holes, which seemed to explain the guide's reluctance to undertake this part of the route by moonlight. Arrived however at the foot of the cone, the snow ceased, and a heavy climb up the frozen side under a biting wind began. Half way up matters were not improved by a severe attack of sickness; but at length the top was reached at 6.20 a.m. There was no distant view; within the crater the steam and smoke kept being blown hither and thither, and cleared off at times sufficiently to show parts of what looked like a bottomless pit. It was a curious and weird sight altogether, and well repaid the fatigues of the journey. During the descent the notes of the cuckoo and some very sweet violets found by chance under the snow reminded us that, notwithstanding the mountain's wintry mantle of white, it was really spring time, and that the morning sun had ushered in the merry month of May, a fact which we had well nigh forgotten but a few hours before, when our fingers were numb with cold and our ears threatened to become a thing of the past.

G.

Colour Combinations

THE production of white by red and green solutions is well seen on mixing cobalt and nickel solutions together in proper proportions. Another interesting example is that of electrically deposited copper immersed in a solution of copper sulphate. The first notice of this, so far as I know, occurs in Shaw's "Manual of Electro-Metallurgy" (1842), p. 33, in the following terms:—

"This phenomenon may be observed in great perfection by the electrolyte; the solution of sulphate of copper is of an intense and pure blue; and the newly precipitated ductile copper is of

an equally pure orange; let the reader take a vessel containing the cupreous solution and place it in the sun, in order to have an abundance of light, and immerse in it, in a horizontal position, a piece of new electrotype copper; immediately the metal sinks beneath the surface of the blue solution the orange tint fades, and by placing it at a proper depth altogether vanishes, and the metallic plate appears intensely white; when nicely adjusted the plate so much resembles plaster-of-paris that a person unacquainted with the nature of the experiment would with difficulty be persuaded that it was not made of that substance."

Birmingham and Midland Institute, C. J. WOODWARD
June 14

P.S.—In mixing red and green solutions is it correct to speak of them as *producing* white? I take it that the mixture absorbs more light than the two solutions would do if separate, i.e., the solution of nickel transmits a greenish white, the cobalt solution a reddish white, but together the red and green destroy each other, the excess of white light passing through. This is shown forcibly by using strong solutions, when the deep red and green produce, not white, but black.—C. J. W.

Wild Swans—Notes of Birds

THERE are at present eight wild swans in a lake not far from here. I believe them to be part of a flock of sixty which were there all through the winter. Wild swans in summer were never, so far as I know, heard of in this part of the world before. I have always carefully preserved the wild fowl on this lake, and I pay increased attention to the swans, which I hope will be safe from poachers. They swim in pairs, but show no signs of nesting.

The *major* cuckoo noticed in my letter (NATURE, vol. xxii. p. 76) is still here without any other *major* that I could find in this place or in the neighbourhood. Referring to your polite correspondent A. N., in p. 97, I must remark, for the fair fame of the cuckoos, that his theory relating to sex seems quite unsustainable. Certainly if all the minor cuckoos about here were males and the single *major* a female it would show an instance of polyandry (if the term can be applied to birds) such as could scarcely be matched in the whole range of natural history. I quite agree with Mr. Newton (p. 122) that the female cuckoo does not sing; and it might perhaps be unamiably suggested that the comparative silence of the females among the lower animals seems among the most marked distinctions between them and the human race.

Regarding Mr. Allen's letter (same page) I can only say that, while his experiences are so different from mine, there must be an imperfection of ear in either of us, and, without any notion of insisting on the correctness of my own, I should like, at least, to hear the testimony of other parties in the matter. Of course I referred to cuckoos in full voice in the height of the season. When their voice begins to decline, their notes vary, and, as a friend of mine expresses it, they "sing anyhow."

Millbrook, Tuam, June 18

J. BIRMINGHAM

Anchor-Ice

ALLOW me to say in reply to Mr. Rae's kindly criticism (NATURE, vol. xxii. p. 54) that I did not assert that the original ice-crystals are "at least as heavy as water," but that they "seem" to be so (vol. xxii. p. 81).

I have seen them collect upon stones at the bottom of waterways two or three feet in depth—where the stream though swift was smooth and unbroken,—and I have thought that this might be the result of their having a greater specific gravity than ordinary ice.

In my desire to be concise I had the misfortune to use a phrase that gave Mr. Rae the impression that I was asserting as a fact that which at best I have only regarded as possible.

Boston, June 7

C. F. C.

SCIENTIFIC RESULTS OF THE HOWGATE POLAR EXPEDITION, 1877-78

THE fifteenth Bulletin of the United States National Museum (Washington, 1879) consists of contributions to the Natural History of Arctic America, made in connection with the Howgate expedition in 1877-78, by Ludwig Kumlien, naturalist to the expedition, who gives

a most valuable and interesting account of his ethnological observations and important notes on the habits of the birds and mammals of the region explored. Capt. Howgate's expedition was one which had several different ends in view. The primary object of it was the collection of skins, sledges, dogs, Eskimo, and other necessaries for a future colony in Lady Franklin Bay. A secondary object was scientific exploration, whilst the only remuneration of the crew was derived from ordinary whaling operations, every one excepting the scientific men on board the *Florence* having a "lay" in the voyage. The *Florence*, in which the voyage of the expedition was made, was a fore-and-aft schooner of fifty-six tons, which had before been engaged in sealing in the southern seas. Mr. Kumlien necessarily found so small a vessel extremely disadvantageous for scientific operations. He had to leave valuable skeletons of mammalia behind, and could have procured more in addition, if only stowage room had been available.

The explorations of the expedition were made in Hogarth Sound on the western coast of Davis Straits. Hogarth Sound, the Cumberland Straits of Baffin, lies in Baffin's Land, and its western coast is called Penny's Land, after Capt. Penny, who visited it in 1839. The northern part of the Sound is crossed by the Arctic Circle. The Sound is about thirty miles wide at its widest part, its length is uncertain, but over 150 miles. It has been frequently visited by Scotch and American whalers during the last twenty-five years.

The *Bulletin* commences with a long paper by Mr. Kumlien on the Eskimo of the Sound, from which we gather the following interesting statements. The natives are fast diminishing in numbers, and the total population of the Sound is estimated by the author at not more than 400 individuals. The Eskimo are peaceful now, but have numerous traditions of former wars, in which they relate that the hurling of stones was the most effective and common mode of warfare.

The natives have, as usual, suffered by contact with white men, and the Hogarth Sound Eskimo of to-day, with his breech-loading rifle, steel knives, cotton jacket, and all the various trinkets he succeeds in procuring from the ships, is worse clad, lives poorer, and gets less to eat than did his forefathers, who had never seen or heard of a white man. He barters a seal-skin that should have been used for repairing the tent, for a little tobacco, or some valueless trinket which is soon thrown aside.

The children are, when young, quite fair; the adults are so begrimed with soot and grease, that it is impossible almost to tell their real colour, but there are some pure bred Innuits whose skins are no darker than a white man's would be if subjected to the rigours of wind and cold.

"There are at present so many whaleboats owned by the Eskimo, that they experience little difficulty in making quite extensive cruises, three or four families constituting a boat's crew. They will load a whale-boat to within an inch or two of the gunwale, and then set out for a few weeks' enjoyment and abundance. The squaws do the rowing and the captain stands majestically in the stern with the steering-oar, whilst the rest of the men are either asleep or on the look-out for game. The cargo consists of the tent-poles, the skin-tents, pots, and lamps, with sundry skin-bags containing the women's sewing and skinning utensils. The hunting-gear forms, of course, quite a conspicuous portion of the contents of the boat. Very few there are at present who have not become the possessors of half a barrel, and this vessel occupies a conspicuous place in the boat, and is constantly receiving additions of animal matter in some shape; a few young eiders or gulls will soon be covered up with the intestines of a seal and its flesh. From this receptacle all obtain a piece of meat whenever they feel hungry. This vessel is never emptied of its contents except by accident or

when scarcity of material forbids its repletion; and as the temperature at this season is well up in the sixties during the day, this garbage heap becomes so offensive as to be unbearable to any but an Eskimo."

The powers of endurance of these Eskimo appear to be no better than those of whites. Few of them could stand a tramp through the snow all day long better than the members of the expedition, but, as in the case of other savages, it was in "tracking" that they showed their superiority most markedly. "They will follow animal tracks in the snow for a whole day when we confess we could not discover the faintest trace of a track except at long distances apart."

The women's dress differs from that of the men in that their trousers are composed of three separate pieces, the lower reaching from a little below the knee to the middle of the thigh; when at work in their igloos they take off the lower pieces and use their bare thighs as boards for cleaning sealskins on. Amongst most races, as in England, the dress of young children—both boys and girls—resembles that of their mothers, but Eskimo little girls wear trousers like those of the men, made all in one piece, until they are twelve years old.

Most of the Eskimo cannot count higher than ten, and many not higher than six; some are said to have numbers to twenty, but they are few. The names of the same numerals are differently pronounced, and difficulty was experienced in finding a native who knew the names well enough to give them all up to ten.

When a woman is about to be confined she is placed in a small skin tent in summer or a small snow hut in winter, with a little girl only to attend her. This is done for fear the mother or child may die, in which case the tent and all in it could never be used again. For the same reason any native when very ill is carried out to die. In some instances this custom is obliged to be modified. For example, a tent cover thus under tabu is sometimes cut off at about two feet from the ground all round, and the top is used. In one case a man's wife shot herself accidentally in her igloo; the gun was too great a sacrifice for the husband; he used it, but everything else was left to waste away where it lay. After the birth of the child the mother, with the child on her back, is conducted by an aged female ancoot to a level spot on the ice, where a curious ceremony of marching in circles is performed.

The following legend gives directions as to how a person may become an *ancoot* or *angekok*. It is interesting because it does not differ essentially from the Greenlanders' account of the same thing. An "ancoot" may be regarded as the most primitive representative of the priestly office.

"Any one wishing to be an ancoot must go away a long distance from where there is any other person. Then he must find a large stone and seat himself by it, and call on *Torngarsuk* (the greatest spirit of good and evil; the name is now used by instructed natives for the devil). This spirit will then make himself present to him. The would-be ancoot will at first be very much frightened at the arrival and appearance of the spirit, so much so that he is seized with severe pains and falls down and dies, and remains dead for three days. Then he comes to life again, and returns home a very wise man."

An ancoot's duty is, first, to heal the sick by muttering over them; secondly, to talk to *Torngarsuk* and get useful information: thirdly, by this means to foretell deaths and misfortunes. He leads in such ceremonies as the killing of the evil spirit of the deer, an extraordinary jumping, shouting, and stabbing performance directed against an imaginary deer. A successful ancoot of long standing may reach higher grade and become a great ancoot by means of periods of fasting and an existence for a time in the condition of a walrus.

If an ancoot's prophecy does not come to pass, he says that a halo, corona, aurora, or some such phenome-

non which has occurred has broken the spell ; but often he is truly oracular in his utterances, as in a case overheard by the author, in which one was asked by a young woman if her child would be a boy or a girl. He went outside the hut for a time, and on returning said it would "be a boy," but "if it is not a boy it will be a girl." His fee for this was three sealskins and a knife.

The Hogarth Sound Eskimo, unlike the Greenlanders, have no permanent habitations. They live in snow houses (*igloos*) till June, when the snow melts, and then take to their skin tents or *toopiks* till the latter part of October, when they build igloos again.

A detailed account of the mode of making of the igloos is given, and a horrible one of the condition of the inhabited interior. Behind and around the lamps the Eskimo pile up their meat, and the pile soon becomes extremely offensive both to sight and smell. Meat is sometimes brought in that is already spoiled, although the temperature may be 50° below zero. This often happens with deer, which, unless disembowelled as soon as killed, rapidly decompose inside before freezing through.

Bows and arrows have been discarded for fire-arms, but are, as usual amongst other races, maintained in use by the children, who kill snow-birds and lemmings with them. The Eskimo are not very expert at making traps or snares apparently, but the simple box-trap of ice for foxes seems to be very effective. The slab of ice which falls and closes it is simply supported by a small upright of ice resting on the bait, and comes down directly the fox pulls at the meat. The author tried steel traps for the foxes, without success ; the wily foxes always dug under the traps in the snow, and got at the bait from below.

Nearly all the Eskimo become snow-blind in spring, and generally do not put on their well-known wooden eye-blinders until the condition of their eyes forbids their going out without them.

The ceremony of greeting a stranger on his arrival at a village is curious, and ends by the ancoot and the stranger stepping out before the villagers and dealing one another alternately a knock-down blow on the cheek, the ancoot of course having first hit : the two then kiss. In another ceremony vestments are used, that is to say, the ancoot puts on a great many pairs of trousers, as a preparation. Formerly all the implements of a dead man were left to rot in his grave, as amongst other American races and so very many peoples in various parts of the world, but of late years the Eskimo have amended this usage, and after the things have remained a short time in the grave, they are taken out and used again by the relatives. In very recent graves tin cups and pots, knives, and even one fork, a photograph, and a *Harper's Weekly Newspaper* were found, a fact which reminds us of having seen a sewing machine rusting on the grave of a Chinook woman in Oregon.

Charms of very various kinds are worn about the person by the Eskimo, and much prized and handed down for generations ; one such consisted of two small stones, one a bluish flint, the other apparently meteoric iron. An ancestor discovered by accident that the two would strike fire, and became, in consequence of their possession, a great man amongst the people. The old woman to whom this charm belonged, considered it of inestimable value, for she said, "No one has yet died while wearing this charm." The ancoots are often very expert jugglers. A common trick is for one of them to come into a hut with a harpoon toggled in his breast and the handle sticking in his back, the wound bleeding profusely.

Of the creation of man the Eskimo say : "In the beginning there grew up from the earth a man ; he got a wife from one of his thumbs, and from this pair the race has originated. But the whites, whom they call *cablunet*, or *codlunk*, they have sprung from dogs. An Eskimo woman at one time gave birth to human beings and dogs.

The latter she put in an old boot, and threw them out into the sea, saying, Go hence, and become white people. From this it happens that the whites live on the sea and their ships are like Innuit's boots, round at both ends. This is a very different notion from the Australian "tumble down, black fellow, jump up, white fellow," and less complimentary to the pale faces.

A good deal of the information about the Eskimo given by the author is of course not new, but the descriptions are very fresh and good, and it is of importance to have so full an account of the present condition of the natives of the west coast of Davis Straits.

An account of the mammalia of Hogarth Sound by the same author follows the ethnological ones. The mammalia seem to be disappearing from the neighbourhood with great rapidity. Bears, walrus, and the hooded seal are very scarce up the sound, and of the musk-ox the traces remain only in the personal name "omingmuk," which is used commonly amongst the Eskimo, who know the animal well as found far to the north.

In the account of the Eskimo dogs the curious theory is upheld by Mr. Kumlien that the peculiar rabies of which they so commonly die is produced in the males by unrequited affection towards the opposite sex, and instances in proof are cited. At least four-fifths of the dogs so dying are males.

There is an interesting account of the various seals of the coast and their habits, and of the modes of catching them adopted by the Eskimo, and also of the whales. The author has known the white whales (*Beluga catodon*) to come in close proximity to the ship and lie along her sides for protection when pursued by the grampus or killer, *Orca gladiator*. The white whales ascend the sound as soon as the ice begins to loosen, but for what purpose seems uncertain ; the mothers already have their young with them, and as little or nothing is found in the animals' stomachs when killed, they do not appear to go up the sound for food. In July they repair in hundreds to the sand-beaches of the fjords. The author suggests that perhaps they roll against the sand to free themselves of parasites. Numerous seals (apparently *Pagomys fætidus*) were found inhabiting a fresh-water lake, Lake Kennedy, lying at a considerable distance inland.

In the account of the birds, also by Mr. Kumlien, some curious notes on the habits of ravens, which are extraordinarily common on the sound, are given. Six or seven hunting in company soon kill a young reindeer, and "in the capture of the young seal, *Pagomys fætidus*, the birds evince a considerable degree of intelligence. I have on different occasions witnessed them capture a young seal that lay basking in the sun on the ice near its hole. The first manoeuvre of the ravens was to sail leisurely over the seal, gradually lowering with each circle, till at last one of them suddenly dropped directly into the seal's hole, thus cutting off its retreat from the water. Its mate would then attack the seal, and endeavour to drag or drive it as far away from the hole as possible. The attacking raven seemed to strike the seal on the top of the head with its powerful beak, and thus break the tender skull. In two instances I allowed the combat to proceed until the seal was killed, and then drove the ravens away. I found no marks upon the seal except those of the blows upon the head, which had fractured the skull in two places." Two ravens were seen to chase a hare in concert and kill it.

We regret that we cannot follow the author further.

The *Bulletin* contains lists of the fishes collected in addition, by Mr. T. H. Bean, with descriptions of species ; of the crustacea by Mr. S. S. Smith ; of the annelides, tunicata, bryozoa, echinoderms, and coelenterates by Prof. Verrill ; of the mollusca by Mr. W. H. Dall ; of the insects by Messrs. Edwards and Scudder ; and of the plants by Prof. Asa Gray and Messrs. E. Tuckerman and W. G. Farlow.